approach

OCTOBER 1977 THE NAVAL AVIATION SAFETY REVIEW

BEWARE
THE FUEL
SYSTEM!
LOW

What you don' t know can hurt you.

"The pilot lacked knowledge of the aircraft fuel system, misread the fuel gage, and exercised poor judgment by failing to take appropriate emergency action upon illumination of the low fuel caution light."

"The pilot was unsure of procedures when low fuel lights are on, failed to declare a low fuel state emergency, and placed too much confidence in his fuel gage."

"The pilot displayed inadequate knowledge of the fuel system, demonstrated poor judgment, and ran the fuel tanks dry."

THESE are some telltale quotes from aircraft accident narrative summaries. Unfortunately, these quotes stem from mishaps that are not rare. Every year, the Navy loses aircraft because pilots don't know as much as they should about the fuel system in their aircraft. Most of these mishaps are completely preventable, and the preventive action is simple and straightforward – learn the fuel system!

Knowing your aircraft systems has long been stressed as an important requirement for analyzing inflight failures or system malfunctions. And of all the aircraft systems, none is more important to know thoroughly than the fuel system. Let's face it . . . if you don't know all you should about the hydraulic system, for example, you might lose some or all of your hydraulically powered equipment. But, given the backup systems available in most aircraft, you should still be able to return and land the airplane safely under most circumstances. But . . . if you don't have fuel going into your engines, that flying machine is going to cease flying – and there's no backup system for your powerplant!

Over the years, there have been many instances of aircraft accidents where the pilot's lack of knowledge about the fuel system was a factor in the mishap. Many of the accidents involved fuel-starved engines with plenty of fuel still aboard the aircraft, but in cells that did not feed the engine. Other mishaps occurred in conjunction with fuel transfer failures or other emergencies that were not handled correctly. Still others occurred simply because the pilots put too much faith in errant fuel gages, or they refused to believe low fuel lights. At best, the result was a scared and embarrassed pilot; at worst, a dead pilot and a destroyed aircraft – a high price to pay for not taking the time or effort to learn this vital system thoroughly.

A computer study for FY-72 through the present reveals that the A-7 has had the most pilot-related fuel mismanagement mishaps. The aircraft break down as follows:

A-4	3	A-3	1
A-6	4	C-117	3
A-7	6	C-118	1
E-1/C-1/S-2	4	H-2	1
E-2	2	H-46	2
T-28	5	H-53	1
F-4	4	TH-57	1
F-14	1	P-2	1
H-1	2	T-2	3
T-33	1	T-34	3
AV-8	2	U-11	1

These figures do not include mishaps such as running out of fuel due to being lost or during a low state bingo. They include only mishaps where the pilot's lack of knowledge or understanding of the fuel system was a factor.

As with most mishaps, accidents and incidents related to the fuel system most often happen when several unusual or different circumstances occur. A discussion of some common areas of fuel-related mishaps will give an idea of how lack of knowledge of the fuel system gets aircrews into trouble.

Too much confidence in the fuel gage. Aircrew overreliance on the fuel gage reading was the single largest cause of fuel mismanagement mishaps. Miscalibrated fuel gages, malfunctioning sensing probes, electrical failures, and inherent inaccuracies in the system all combine to make fuel quantity gage systems less than completely accurate 100 percent of the time. Yet, history shows that many pilots have chosen to place complete trust in the fuel gage – and some have paid the consequences. While the problem of overreliance on the fuel gage appears in all

FUEL

aircraft communities, it is more prevalent in prop and helo aircraft probably because they use far less fuel than jets, and non-jet pilots are more used to working at the lower ends of the fuel quantity range than are jet pilots. But a fuel-starved engine will quit whether it's recip, turboprop, or turbojet. And many have. For example . . .

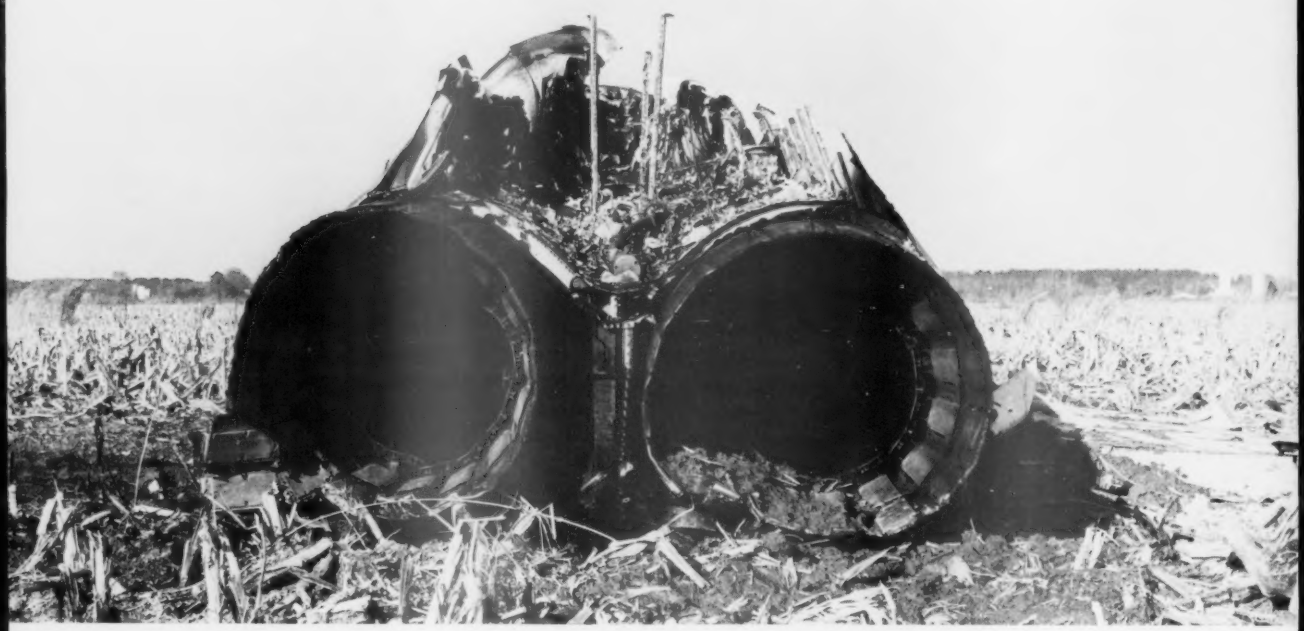
A flight of three UH-46s departed after a fueling stop for the second leg of their three-leg cross-country. One hour into the flight, the leader decided he had sufficient fuel to make it all the way to their destination. With the concurrence of other members of the flight, they pressed on. Forty miles from the destination airport, the No. 2 aircraft reported insufficient fuel to reach the desired airport. Accordingly, he and No. 3 diverted to a closer landing field. Lead continued, however. Eight miles from the field, indicating 195 pounds in each tank, both engines flamed out. The pilot executed an autorotation into a small pond.

Cause of the flameout was fuel starvation. Investigation revealed that the left gage was in error by 195 pounds and the right, by 150 pounds. Also, when the flameout occurred, the pilot was flying with the left boost pump on, crossfeed open, and right boost pump off to equalize fuel quantity indications. The pilot erred by pressing on to his destination and using crossfeed system after the low fuel light was on.

An E-2B landed following an 1100-mile cross-country flight. Turning off the runway, the engines flamed out due to fuel exhaustion. Investigation revealed that the fuel gages had been miscalibrated by NARF. The low fuel light did not warn the pilot because he had left his internal lights' rheostat turned on, dimming the warning light to a point where it was invisible during the day. This pilot's reliance on the fuel gages rather than accurate flight planning and Howgozit updates almost resulted in an accident.

Given the incidence of fuel gage miscalibrations and malfunctions, it would seem prudent for pilots not to rely on the fuel gage at the lower end of its band. Most aircraft NATOPS manuals have guidelines describing the minimum quantity of fuel below which the gages are not considered accurate. Invaluable backups to the fuel gage are preflight planning, an accurate record of fuel use in flight, and continuous updated estimates of fuel remaining.

Believe that low fuel light. Closely related to overconfidence



A frequent consequence of a pilot's lack of knowledge about his aircraft's fuel system.

APPROACH is a monthly publication published by Commander, Naval Safety Center, Norfolk, VA 23511. Subscription price: $11.70 per year; $2.95 additional for foreign mailing. Subscription requests should be directed to: Superintendent of Documents, Government Printing Office, Washington, DC 20402. Controlled circulation postage paid at Norfolk, VA.

Placing complete trust in the fuel gage alone can result in unscheduled landings.

in fuel gages is disregarding the low fuel light. Almost every aircraft has a low fuel light which serves to warn the pilot of his fuel state. In many aircraft, it also signals some type of fuel transfer failure. Most aircraft have a sensing system independent of the fuel gage which provides a backup (and sometimes a primary) indication of low fuel levels. Amazingly, some pilots have chosen to disregard the low fuel light and press on, believing either that the fuel gage is more accurate or the light is erroneous. This has been a tragic mistake in several mishaps.

An A-6 crew was descending toward a target area after 80 minutes flight time on a weapons training sortie. The low fuel light illuminated for a few seconds, but the crew thought it was an errant light and continued with the mission. On climbout from the target, the low fuel light came on bright and steady, but the pilot still chose to disregard it. Descending toward Homebase, both engines flamed out. The pilot attempted a dead stick landing into an outlying field, but ejected when he realized he couldn't make it.

Inspection of the wreckage revealed substantial amounts of fuel in the wing, a trace in the aft tank, and none in the tank that feeds the engine. A DIR of fuel system components revealed a malfunction of the main tank pilot float valve which caused a fuel transfer failure. The pilot and B/N both lacked knowledge of the fuel system, were not aware of the independent operation of the low fuel light, and placed all their confidence in the totalizer quantity. Finally, their total disregard of the low fuel light ordained the accident.

Another mishap stemming from disregard of the low fuel light resulted in only engine failure on deck, but the T-28 was only seconds from total destruction. An instructor and student were on a cross-country flight and had RON'd at an AFB that had no AVGAS for the *Trojan.* The instructor believed he had enough fuel to make it to a Navy base about 35 minutes away, based on his fuel gage reading. Ten minutes after takeoff, the low fuel light illuminated. The pilot was still reading adequate fuel on his gage, so he chose to continue to the Navy destination without declaring an emergency. On landing rollout, the engine quit from fuel starvation. The aircraft was towed to the transient line where it was serviced with 176 gallons of fuel – the total capacity of the T-28. Again, a combination of malfunctioning fuel gages and the pilot's disregard of the low fuel light almost cost the Navy an aircraft.

There have been several instances where malfunctions of low fuel lights in conjunction with transfer failures have resulted in engine flameouts without the pilot being aware of any problem. However, there have been very few cases recorded where a fuel light came on erroneously. Any system is subject to malfunction, of course, but historical records strongly indicate that if a low fuel warning system fails, it is going to fail by *not* coming on rather than coming on. When it does illuminate, why gamble that it's wrong when the odds are so against it? Land ASAP.

Fuel system malfunctions caused by electrical failures. Modern jet aircraft have large requirements for fuel but limited space to carry it. Therefore, fuel cells are located in various parts of the aircraft, requiring a sophisticated fuel transfer system to get fuel to the cell that feeds the engine. In most aircraft, this system is dependent, to varying degrees, on electrical power. What happens when electrical failures occur – either total or partial – is something that every pilot should know about his aircraft.

An AV-8A experienced an electrical failure after takeoff from a cross-country base. The pilot elected to continue on to Homebase rather than return immediately. One hour and 13 minutes later, the engine flamed out. The pilot ejected safely, but the aircraft was lost.

Investigation revealed that the pilot had secured both boost pumps and the fuel flow proportioner following the a.c.-d.c. failure. (Both batteries were left on.) This action probably created a fuel imbalance, and when the battery voltage dropped due to discharge, the fuel flow proportioner came on automatically. If one feed tank was

empty – or nearly so – when the fuel flow proportioner came on, it would cavitate the fuel lines, causing engine flameout. The pilot erred by continuing the flight with an a.c.-d.c. electrical failure, using improper NATOPS procedures, and not knowing the fuel system sufficiently.

The A-7 has a sophisticated system of fuel transfer sequencing, activated by thermistor beads in the fuel cells as they are covered or uncovered by fuel. As long as normal electrical power is available and the transfer selector is left in AUTOMATIC, everything works by itself. When electrical problems occur, however, it is time to be cautious. Two A-7s have been lost due to fuel exhaustion originating with a main generator failure.

The first *Corsair* had a generator failure climbing through 23,000 feet after launch from a carrier. The pilot deployed the EPP (emergency power package) in the CRUISE position, but this did not restore power. He then cycled the switch to TO/LAND, and limited emergency power was regained. The wingman in the flight joined at this time, but rather than immediately bingoing or recovering together, the decision was made to send the operable aircraft on its bombing mission while the troubled aircraft remained overhead. Fifty-eight minutes after launch, the engine flamed out. The pilot attempted several relights and finally ejected when none were successful.

Postaccident analysis revealed that motive flow (powered fuel transfer) sequencing between tanks is stopped with a generator failure and the EPP in the TO/LAND position. In this condition, motive flow is limited to the tank where it was positioned at the time of electrical failure. In this accident, that meant that virtually no wing fuel was available to the pilot. The backup emergency fuel transfer system is also inoperative in this configuration. When the fuel in the fuselage tanks burned out, a flameout was inevitable.

The pilot erred by not landing or bingoing as soon as he experienced electrical problems. He didn't get much help from the Pri-Fly rep either, as apparently neither of them was aware of the effect of electrical problems on fuel transfer.

The moral of these mishaps is obvious: if you are not aware of the interrelationship between your aircraft's electrical system and fuel system, you'd better find out. Also, if you do have an electrical problem, whether it affects your fuel system or not, you'd be wise to get that aircraft on deck as soon as practicable.

You've got to know about ground fuel systems, too. Not all mishaps related to aircrews' lack of knowledge about the fuel system occur in the air. Knowing how to fuel the aircraft and observing other ground servicing precautions at cross-country bases is almost as important as inflight knowledge of the fuel systems. Mistakes made on the ground invariably translate into inflight emergencies.

Such was the case with a T-28 that had RON'd at a lakeside airport. On landing, the pilots had decided not to take on any fuel since no contract fuel was available. Thus the aircraft sat for 2 days in conditions of high humidity and heavy rainfall (conducive to condensation) with the tanks only three-fifths full. The pilots changed their minds and decided to fuel the *Trojan* before takeoff, but they did not take fuel samples prior to takeoff. Shortly after takeoff, the engine suddenly quit, forcing the crew to ditch in the lake. Investigation revealed water in the fuel lines and carburetor due to condensation.

In addition to servicing, ground fuel system knowledge must include several key preflight items. In a T-2C, the instructor and student both overlooked the pressure fuel level control test switch stuck in the TEST SECONDARY AND TIPS position. This prevents tip tanks fuel from transferring. After takeoff, the student reported transfer selected. The instructor noted no transfer but decided to wait and see if the student detected the transfer failure. At level-off, the student reported 1200 pounds internal fuel remaining and the transfer switch inoperative. The *Buckeye* returned and made a precautionary landing. The instructor was cited for his poor preflight and inadequate knowledge of the fuel system.

Miscellaneous mishaps. The above mishaps represent common areas of error associated with the fuel system. They by no means reveal the whole range of errors, as the following mishaps reveal.

- A replacement pilot flying a KA-3B settled below flight deck level on two consecutive cat shots. Flaps and trim settings were normal. Investigation ashore revealed 4500 pounds remaining in the wings which were not included in the RP's weight calculation for the cat shots. The wing fuel registered on the fuel gage, but the pilot assumed the gage was in error. He had earlier selected wing and aux tanks dump and assumed all the fuel had been dumped. However, he had secured the dumps when the NFO reported no visible fuel coming out the dump mast, rather than waiting the prescribed period of time as dictated by NATOPS. The end result was incomplete fuel jettison, and the *Whale* was shot with end speeds of -1 and 5 knots. Not an enviable experience on your first carqual in type!

- An A-7B pilot manned his aircraft for a 10-minute ferry flight to return his aircraft to Homebase following offload from a carrier. On start, the low fuel light was on, 1000 pounds was indicated in the fuselage cells, and 3800 pounds was in the wing. Five minutes after takeoff, the engine flamed out due to fuel starvation. The aircraft had been defueled incorrectly prior to offload from the ship. Fuel was taken from the fuselage cells rather than the wing

cells. The pilot erroneously believed that all the fuel indicated by the M-needle (fuselage fuel) was available to the engine. In fact, defueling from the fuselage rather than the wings results in abnormal fuel distribution, causing fuel to be trapped in cells where it cannot be transferred to the tank that feeds the engines. The pilot's unfamiliarity with the fuel system, his decision to take off with a low fuel light on, and the plane captain's refueling error all contributed to the loss of a costly A-7.

• An F-4 crew noted a low fuel light with the tape reading 2000 pounds and the counter, 6000 pounds. The pilot checked switches for internal wing transfer and selected emergency transfer. During return to base, the tape and counter continued to decrease with approximately the same differential. Postlanding inspection revealed the bleed air switch incorporated by AFC 440 was in OFF vice NORMAL.

• The pilot of an SH-2F bingoed from a ship where he had been conducting touch-and-go landings. He had 300 pounds internal and 600 pounds in the auxiliary fuel tank. As the helo taxied into the refueling pits following landing at Homefield, the engines flamed out due to fuel starvation. The aux tank transfer in the H-2 is actuated only with the gear up, and the length of the trip was insufficient to pressurize the tank sufficiently to transfer fuel. The pilot failed to take this into consideration and bingo at the prebriefed 600 pounds. Also, squadron personnel aboard the ship failed to ensure he refueled to at least 600 pounds prior to his bingo.

• During an IUT flight in a T-2C, both engines flamed out. Relights were successful. The aircraft was flown in a negative or zero G condition in excess of the NATOPS allowable time limit, causing temporary fuel starvation to the engine.

• An A-6 experienced runaway noseup trim on climbout. The pilot, not having flown the A-6 in 106 days, did not remember what action to take and reverted to the procedures for runaway noseup trim (extend the RAT) in another aircraft he was currently flying. The B/N was told to pull the lat/long trim circuit breakers while the pilot secured the generator switches (he thought). An emergency was declared, and the *Intruder* headed back for Homeplate. However, on deep base leg, the engines flamed out. Cause of the flameout was fuel starvation caused by the pilot's securing the engine master switches instead of the generator switches.

All these mishaps clearly reveal the consequences of errors connected with an aircraft's fuel system. While every aircraft's fuel system is different, there are several conclusions that can be made about fuel-related emergencies that apply to all aircraft.

• Don't place all your confidence in the fuel gage. Cross-check your fuel gage by careful preflight planning and up-to-date fuel use computations.

• Believe that low fuel light when it comes on – regardless of what the fuel gage or totalizer reads.

• Know the accuracy tolerances of your fuel gage.

• Know whether the low fuel light is tied in with the fuel gage or is separate.

• Know how to fly a bingo profile and what angle-of-attack or airspeed to fly for max range and max endurance.

• Declare a "low fuel *emergency*" rather than "minimum fuel" when you are at an emergency low fuel state. Declaring minimum fuel means only that you can accept no undue delays, and this will not get you priority handling.

• Know what alternate fields are available if unexpected circumstances put you in a low fuel state.

• If your aircraft has fuel tanks that can be visually inspected, physically sight the amount of fuel in them to cross-check fuel gages.

• Know *how* your fuel system works rather than mechanically memorizing emergency procedures from NATOPS. Increasingly complex fuel systems demand a thorough knowledge of the system in order to analyze the various failures that can occur.

It has been said that the quietest sound in the world is an engine after it has quit. Don't let that silence be due to your ignorance. ◄

No aircraft type or community is immune to fuel exhaustion mishaps due to pilot mismanagement.

Attaboy! Captain John A. Tucker, USMC, and his student, 1st Lt Robert L. Bridgers of HT-18, were returning from a regular syllabus flight for a final landing. On short final, Bridgers reported he was experiencing difficulty with rudder control. He thought his instructor was simulating, unannounced, a stuck right rudder condition.

The student instituted correct procedures by reducing throttle to align the helicopter nose on the desired heading. When he advised Tucker of the problem, the instructor took over immediately. The throttle reduction had been ineffective in reducing yaw.

The UH-1E began a 180-degree right yaw (because the tail rotor control quill failed), even though full left rudder was applied. Capt Tucker rolled the throttle off and made a soft touchdown. The student's early recognition of no rudder control and the pilot's quickly invoking proper procedures averted a potential catastrophe.

Fuel Leak. A P-3 taxied into the fuel pits upon completing a training flight. The fuel pit operator signaled to cut No. 3 engine, and external power was hooked up. The fuel pit operator noticed fuel streaming from the starboard wheelwell. He proceeded to hotfoot it back in front of the *Orion* and signaled the pilot to cut No. 2 engine.

The No. 2 engine was secured, and as the flight engineer deplaned to commence fueling, he was apprised of the problem. He investigated and saw smoke coming from the No. 3 engine intake and the wheelwell. A runner was sent to alert those in the cockpit, while the fuel pit operator went back in front of the aircraft, frantically signaling "cut."

The cut signal was not understood by the pilots, since all engines were secured. However, when the runner reached the cockpit and informed the pilots of the smoke, firefighters were requested by radio. After the transmission, external power was removed, and the aircraft was evacuated. No fire developed, and subsequently, the aircraft was towed to the line. Fortunately, no damage to equipment or personal injury occurred.

During maintenance troubleshooting, a fuel filter inlet connector was found to be leaking. It was removed, and further inspection revealed several scores along the upper connector union. No prior maintenance had been performed on or in the vicinity of the inlet connector in the previous 12 months. A new connector was installed, and no further fuel leakage resulted.

The circumstances surrounding this incident indicated that a review of procedures was in order:

- Personnel were not cleared away from the area when smoke was seen.
- The wrong hand signal was given the pilots by the fuel pit operator when he gave the cut signal vice the fire signal.
- External power was prematurely secured without the permission of the pilot, which limited the pilot's ability to execute emergency procedures.
- A standard fuel leak hand signal does not exist.

The onset of a potential hazard must be immediately recognized, and appropriate corrective action initiated. It is important that hand signals are correctly given and understood. This incident also raises a question: How can fire departments best be notified

of problems in fuel pits?

Methods to alert fire departments during refueling vary from station to station. DODINST 4270.1M requires that some type of fire reporting system must be available. For example, radios on and manned; some fuel pits have a firebox or telephone; and fuel trucks must be equipped with two-way radios. Often, unnecessary delays occur because some refueling personnel are not aware of available communications or the procedures to be followed.

That Sinking Feeling. Most pilots have experienced sinking feelings in their stomachs after they realize they did something wrong. This feeling was definitely experienced by an A-3 pilot recently when he discovered that the sinking feeling in his stomach was matched by the sinking action of his port mainmount.

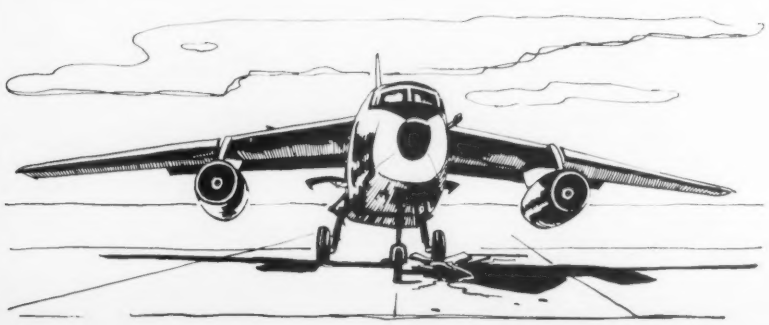
The pilot was scheduled for a max gross weight takeoff on a hot day at a field without an extra long runway. In view of the marginal takeoff condition, the pilot decided to use the runway overrun to give him more runway. A review of the station air ops manual and a discussion with base operations yielded what the pilot thought was a maximum of 86,000 pounds single-wheel weight-bearing capacity for the overrun. Accordingly, he taxied out to the duty runway.

As the pilot attempted to position the aircraft for takeoff on the overrun, he felt the port mainmount settling into the pavement. The plane captain confirmed that the port mainmount was, in fact, penetrating the surface. The pilot secured engines; the *Whale* was defueled and towed back to the line.

Postincident investigation revealed that the 86,000-pound wheel-bearing capacity was for the runway and all other surfaces on the field designated for aircraft operation. No sources could be found that gave specific weight-bearing capacity of the runway overrun, nor was any information available about using the overrun for aircraft operations.

The pilot and navigator must bear the primary responsibility for this incident, but they didn't get much help from their reference publications. An indepth review of the IFR Supplement, FLIP Planning, and local air operations manuals revealed no clear-cut guidance on the use or non-use of runway overruns for takeoff. As a result, the investigation board recommended that a caution be put in the IFR Supplement warning pilots not to use overruns unless specifically stated otherwise. They also recommended that local air ops manuals publish the weight-bearing capacities of the overruns on their field.

All pilots were rebriefed on the hazards of taxiing aircraft on surfaces of questionable weight-bearing capacity. Hopefully, this information will be the only thing that sinks in from now on.



Set What Condition? The PPC of a P-3 was on the downwind leg of a GCA and intended to make a touch-and-go after the approach. A technician requested permission to enter the doppler well to change an APN-141 coupler for inflight evaluation. He was advised by the PPC to go ahead but to be alert for Condition 5 when they turned onto final.

The technician went about his task, completed it quickly, and reported back to the pilot on ICS prior to the aircraft's turn to final. The APN-141 worked properly for the next two approaches and landings. However, it had not been completely secured, and the technician, without notifying the pilot, reentered the well to complete the job.

Meanwhile, the PPC on the next approach was advised of an approaching thunderstorm and decided to make a final landing. He called on the PA system to set Condition 5 and received a roger.

After landing, the technician reported that he had been in the well during landing, but because the noise level was so high, had not heard the Condition 5 call. The "roger" that the PPC received had come from a noncrewman sitting in the radio compartment.

It really goes without saying that the technician should never have reentered the well without permission, and someone in the crew should have hollered to him when Condition 5 was set. Further, prudent action by the PPC the first time would have been to depart the pattern while work was going on in the doppler well and then return after the technician reported the job completed.

The incident resulted in just embarrassment and no injury. But for good health and longevity, the doppler well is NOT the place to be during landing. ◄

A disastrous functional checkflight

The forward transmission input pinion assembly shows the effect of the intense heat.

Closeup of the forward transmission output lube line quick disconnect details the internal fire damage.

A 2-foot section of blade spar was found imbedded in the ground following impact.

ZERO FOUR was ready to test. It had not flown for almost 3 months and had been fitted recently with new blades. All the H-46 required was a track and test. Ground adjustments were made, and the pilot prepared to take off to get a more accurate track. He expected to remain airborne for about 15 minutes, then land, check for leaks, and launch a second time to complete the check.

The pilot called the tower for clearance to go and was cleared as requested. An adjustment had been made (10 clicks), and the forward head checked OK. Shortly, the pilot was told the aft head had been checked, and he prepared to return to base.

Just then the pilot heard a rumbling, intermittent beep noise and asked his copilot if he had ever heard anything like it. The copilot couldn't think of anything, and while talking, the pilot instinctively lowered collective and began a descent. Neither pilot could recall ever hearing the noise before.

Within 5 seconds, the transmission chip detector light came on. The pilot lowered collective even more and descended to about 600 feet. He looked for a place to land, rejecting a return to base because of obstructions. In another 5 seconds, the crew felt a high speed vibration. The pilot likened it to the track being out about 6 inches, but it was a high frequency vibration – about 12 to 1.

The pilot tried to call the tower but was blocked out. He bottomed the collective to enter an autorotation, put out a Mayday, and felt the helicopter go completely out of control. The helo pitched up about 60 degrees, followed by a similar pitchdown. The pilot was wrestling with the controls, trying to get the helicopter reasonably level when it hit. Just before the crash, there had been a loud crack. The blades had intermeshed.

The helicopter struck the ground in a nose-high attitude. It broke into three main sections and was completely aflame. However, the aft cabin and pylon sections were torn away from the rest of the aircraft and flipped over on impact. They smashed into the ground and rolled about 100 feet along the impact line. The cockpit separated from the main cabin section and came to rest about 135 feet and 90 degrees from the point of impact.

View of the forward pylon and the cockpit area with the copilot's seat pulled out.

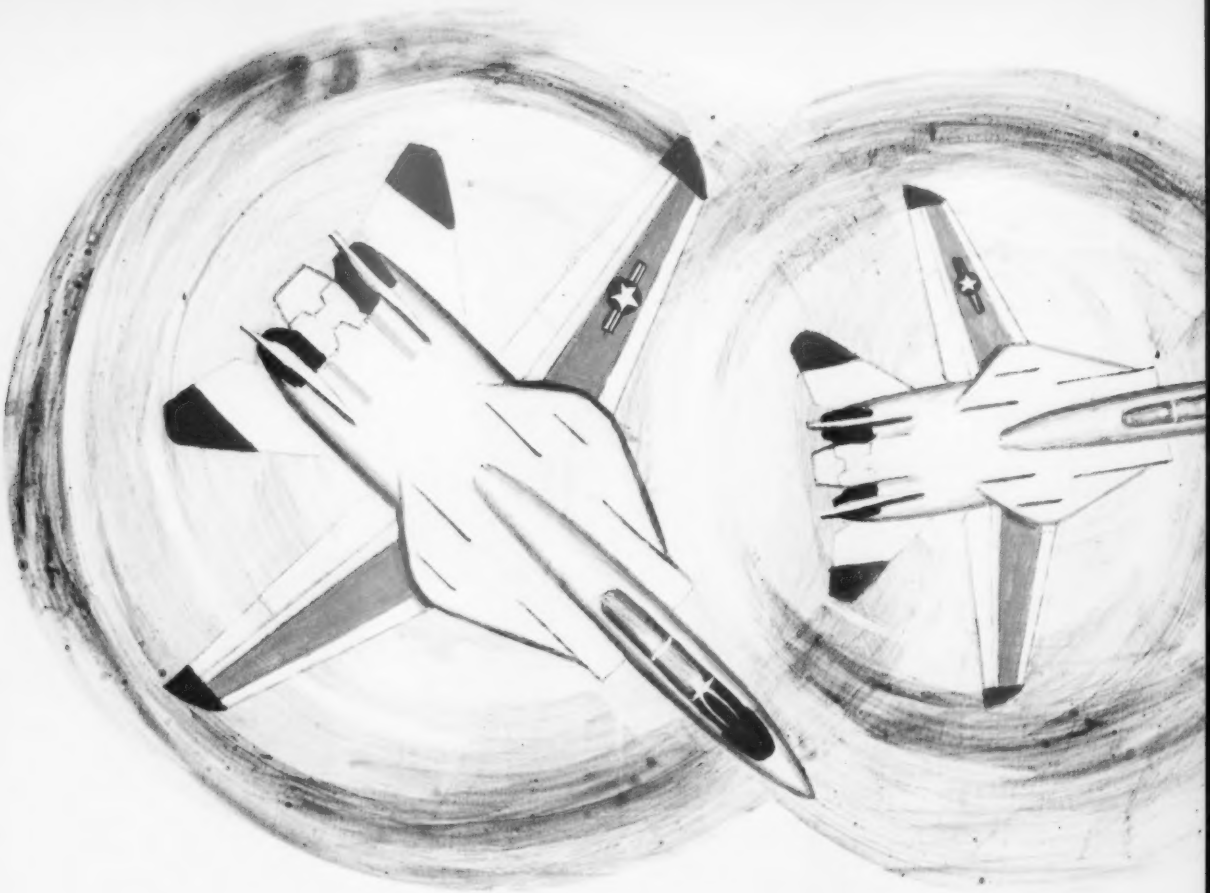
The crash crew arrived on the scene as quickly as possible but were delayed by vehicle congestion. Civilians had proceeded to the scene first and pulled three of the crew out of the wreckage.

Other helicopters in the area proceeded to the scene, and within 30 minutes transported all five souls to a nearby hospital. Tragically, three of the five crewmen died.

The pilot remained conscious the entire time. He remembered feeling funny curled down around the cockpit, amid all kinds of consoles, seats, and panels, but he wasn't in any pain. He saw a flame flicker within reach and tried to beat the fire out with his hands. Then he tried to get out of the mess but couldn't get through a crack in the fuselage with his helmet on. He took off his helmet and got his head and left arm up through the crack, but his legs were caught and he couldn't pull himself up. Civilians finally released him and pulled him to safety.

The investigation subsequently revealed that the input pinion gear had failed, and the input bearing retainer cover was missing. A review of records disclosed that oil samples submitted to a SOAP (spectrometric oil analysis program) lab had excessive levels of iron and magnesium, but the squadron had never received a lab report. Further, an airframes change had not been incorporated even though the aircraft had been through PAR (progressive aircraft rework) twice after the airframes change had been issued.

It is so often true that postmishap investigation reveals several links in the chain of events which, if somewhat different, could have prevented the accident. Such was true in this case. If the lab had reported the extremely high iron and magnesium content in the oil sample, or had the squadron followed up on the sample, steps would have been taken to rectify the situation. Had the airframes change been incorporated, the input pinion gear might not have seized, causing catastrophic failure. ◄



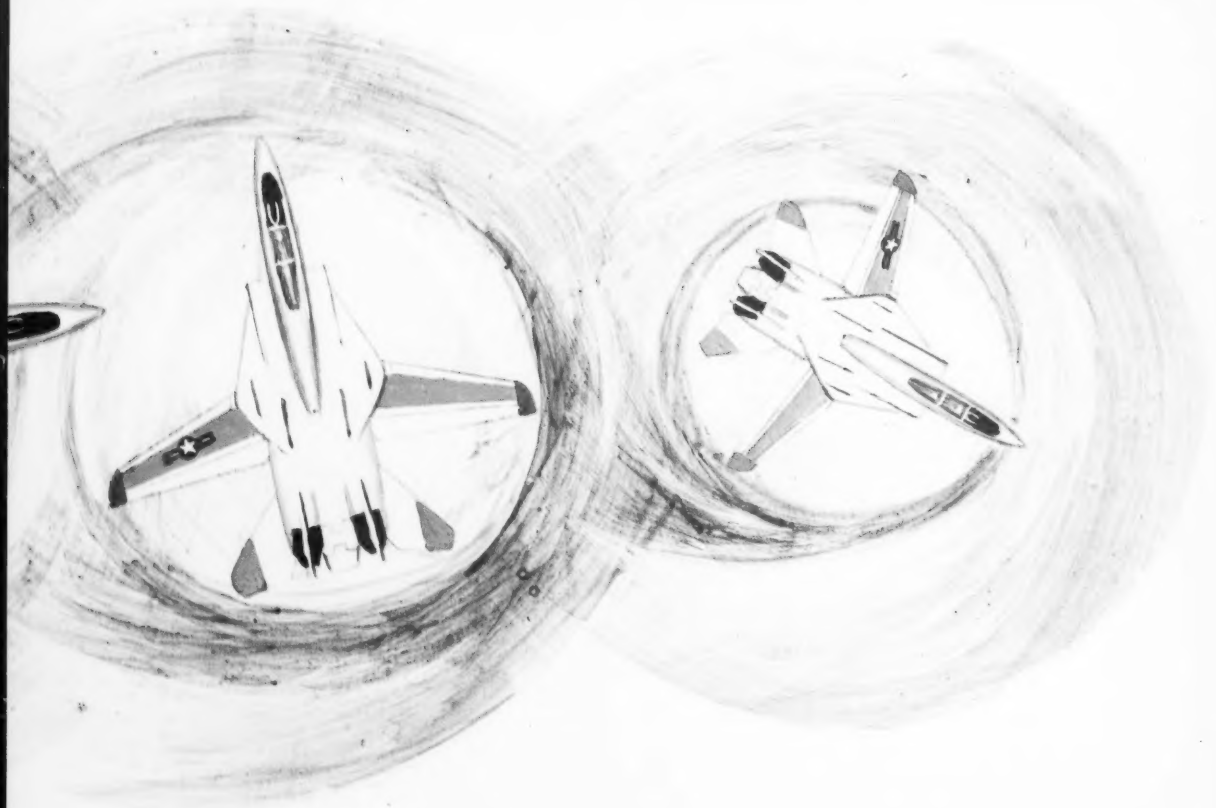
TOMCAT TAILSPIN

Some flat facts

By LCDR J. A. Campbell
VF-14

THE Navy's newest fighter, the F-14A *Tomcat,* has emerged as the most versatile and agile weapons platform to date. With the capability to stand off and fire the Phoenix missile at long ranges, its potential for revolutionizing air combat is unlimited. Beyond that, the variable geometry wing and high lift/drag ratio (aided by the aerodynamic effect of a fuselage tunnel created by widely separated engine nacelles) make the *Tomcat* the premier fighter in classic dogfight terms. Handling characteristics are such that since introduction to the Fleet, the aircraft has gained a reputation for uncommon stability and forgiveness in the high angle-of-attack/slow airspeed regime associated with ACM (air combat maneuvering). Recent mishaps, however, indicate that the aircraft has a stabilized, disorienting, and disabling mode outside of controlled flight – the *flat spin.* The history of the aircraft development and eventual recognition of this out-of-control flight condition may give *Tomcat* pilots an awareness that will enable them to prevent flat spins. It may also provide *all* aviators reason to review some basic principles of aerodynamics and handling characteristics of their particular aircraft.

Initial research and development flight tests in the



F-14A documented its exceptional stability at extremely high AOA (angle-of-attack). Films depicting pitch pulses to greater than 70 degrees AOA reveal no lateral instability. Aircraft response to lateral control inputs at high AOA (above 18 units) produces rolloff in the opposite direction, which is reduced in rate-of-roll by disabling the roll SAS (stability augmentation system). The most frequently reported departure from controlled flight is termed a "coupled roll," in which rolloff induced by lateral stick deflection and aggravated by roll SAS inputs causes the aircraft to roll about its longitudinal axis. However, this is not a true spin, as there is no yaw-generated autorotation.

When flown to near-vertical (80-90 degrees noseup), zero airspeed, the aircraft pitches forward of its own accord to an extremely nose-low attitude, and, with neutral (hands off) controls, regains airspeed and recovers to level flight with normal backstick pressure. Readiness squadrons demonstrate and teach these unusual attitudes and recoveries as basic confidence maneuvers before replacement pilots begin ACM training. The general philosophy has been "This aircraft can't spin unless you force it and hold in pro-spin controls."

The majority of F-14A aircrews have, therefore, been lulled into a false sense of security, armed with the experience of few and the hopes of many that, at last, they are at the controls of the plumber-proof fighter. Although this attitude may reinforce aggressiveness in ACM and confidence in the man/machine concept, it leaves the aircrew unprepared when thrust into the reality of fully developed, highly disorienting, autorotational departures from flight (i.e., a spin).

Each aircraft has its distinct stall/departure/spin characteristics, and all aircrews must continually be made aware of recognition and recovery techniques. Early in the operational life of the F-14, numerous random "uncharacteristic" departures from controlled flight were associated with coupled roll maneuvers in which the aircraft sustained an upright poststall gyration rather than a true spin. Recovery procedures were developed and verified for this relatively mild departure, and aircrews considered the likelihood of disorientation or incapacitation as remote. However, the F-14 community has recently discovered that the *Tomcat* will spin, and in a most disorienting and disabling mode.

Continued

The dramatic film record and aircrew debrief of the first flat spin (during the sixth flight in a series of 10 stall/departure evaluation flights conducted at NATC Patuxent River) changed the atmosphere of relative complacency concerning *Tomcat* out-of-control flight. A trained, experienced spin test pilot was nearly totally incapacitated as the result of approximately seven "eyeball-out" longitudinal Gs. This jolted Fleet and Readiness squadron pilots to attention. The lack of immediate response to antispin controls drew concern. Spin tunnel and radio-controlled model tests as well as empirical data generated from the loss of the aircraft precipitated a rapid action NATOPS change that describes in detail the severity and complexity of the flat spin mode. Revised recovery techniques were developed to counter the spin.

Yet most aircrews believed that since the aircraft was deliberately flown beyond the onset of stall and aggravated by control inputs during the flight evaluation leading up to the departure/spin, that under normal flight conditions, entry into the flat spin was highly unlikely. A further restriction to disable ARI (aileron rudder interconnect) in aircraft so configured to prevent inadvertent pro-spin rudder inputs made the possibility seem even more remote.

Another reason for the theory that the *Tomcat* was immune to spinning was that pilots are extremely uncomfortable with excessive yaw rates. Therefore (it has been stated), they will not continue flight in a regime where yaw rate becomes so great that the aircraft *(Tomcat)* departs from controlled flight. The next two F-14 flat spins amply demonstrated that this seat-of-the-pants statement is unfounded in the dynamic environment of ACM or under the duress of an *extremis* inflight emergency.

The second fully developed flat spin resulted from yaw generated by an *extremis* emergency during engine stall tests on a modification to the F-14A TF-30 engine. While conducting high-AOA engine performance checks, the aircraft departed. As a result, one engine stalled while the other continued to provide CRT (combat-rated thrust). As the pilot attempted to clear the stalled engine, the asymmetric thrust produced by the operating engine generated a yaw rate sufficient to cause the *Tomcat* to rapidly enter a flat spin. The pilot, though disoriented, was not totally incapacitated. Using lessons learned from the previous mishap, he requested that the NFO eject while he remained with the aircraft in an attempt to recover prior to reaching 10,000 feet.

After the canopy and rear seat (with occupant) separated from the aircraft, the spin increased in intensity, and the pilot realized he had lost control completely. The spin became more violent, pinning the struggling aviator against the instrument panel. Only with desperate persistence was he able to initiate ejection. Overshadowing the loss of the aircraft was the tragic loss of the NFO due to overexposure prior to rescue.

The third, most recent flat spin developed as the result of an abrupt, last-ditch maneuver to avoid an imminent midair collision. The rapid application of stick and rudder aggravated by jetwash from the other aircraft resulted in an engine stall as the aircraft departed from controlled flight. The pilot attempted an airstart, but felt he had lost control of the aircraft. At 10,000 feet, the crew ejected with the aircraft in a flat spin to the left. Clearly, the pilot had to react to several immediate emergencies and was unable to analyze and correct for the onset of an unacceptably high yaw rate. The mishap occurred at medium altitude (approximately 12,500 feet), leaving little time for recovery once the aircraft entered a fully developed flat spin.

All three of the above aircraft entered the flat spin because of continued asymmetrical flight in a regime beyond published allowable sideslip limitations. Pilots were unaware of or unable to evaluate and counter the effect of excessive yaw rate, and the aircraft abruptly entered a deadly flat spin.

To date, three documented flat spins have cost the Navy one crewmember and three aircraft. This distressing statistic applies to what is regarded as the most forgiving, stable aircraft in the inventory. Any F-14 aviator who has not yet recognized the potential for out-of-control flight in this aircraft is ignoring the recent events. Perhaps the old adage, "There are those who have, and those who will," applies. Evaluation of *Tomcat* flat spins led to a revitalized, detailed revision of NATOPS spin/departure recovery procedures. Emphasis on flight characteristics and aircraft limitations has provided a series of meaningful, well annotated procedures, which, coupled with flight simulator spin demonstrations, have more fully prepared *Tomcat* crews to cope with out-of-control flight.

The following lessons learned may help prevent future losses resulting from flat spins:

- It is essential that aircrews be briefed and prepared for out-of-control flight beyond the superficial limits of programmed recitation of recovery procedures. Recognition of stall/spin entry, intolerable yaw rates and tumbling, and disorienting flight prior to spin development, especially at lower altitudes, is mandatory. Past mishaps involved extremely high yaw rates, indicating that crews may be preoccupied by other emergencies and not able to counter the engine/control inputs that accelerate the stall and yaw rate beyond recovery. Pilots must be responsive to adverse yaw and neutralize controls early in a departure.
- The violence and disorientation of any out-of-control flight may stupify or otherwise incapacitate the pilot. The aircrew must act as a team from the initial departure if they are to successfully recover the aircraft. In the F-14 flat spin,

the pilot suffers the effects of two to three more eyeball-out longitudinal Gs than the NFO because of the front seat's increased distance from the spin axis. NFO verbal assistance can help orient the pilot, key him to note direction of the spin, and reinforce his application of recovery controls. Furthermore, in the event of loss of control below 10,000 feet AGL, the NFO can more easily jettison the canopy and initiate command ejection.

- The shoulder harness inertial reel is ineffective under 5-6 longitudinal Gs. Pilots must lock the harness at the onset of any violent departure from controlled flight before the effects of longitudinal Gs pin them to the instrument panel, resulting in total incapacitation.
- Departures are aggravated by asymmetrical thrust and by engine stalls while operating in afterburner. Prolonged out-of-control flight with only one engine at MRT or CRT increases the probability of a runaway yaw rate.
- Consciously cross-controlling the aircraft in an effort to counter rolloff at high angles-of-attack flight may lead to snap departures and a flat spin.
- The recovery procedures for the *Tomcat* flat spin have been tested by spin tunnel and radio control model and will work. However, the control inputs are not dramatic, and a "significant number of turns may be required to recover." Lateral stick (differential tail) is the most effective recovery control input. Insufficient altitude, as in the third mishap, leaves little time to let the recovery inputs take effect. However, with sufficient altitude, the aircraft exhibits indications that recovery controls are taking effect. The nose of the aircraft begins to oscillate from the horizontal, and as the aircraft descends to more dense air, the nose continues to remain below the horizon until the aircraft enters a more normal spiraling spin. If aircrews recognize this reaction to controls well above 10,000 feet, they may anticipate recovery and have confidence in their procedures/control inputs.

The F-14A is designed to provide superior performance and maneuverability at the edge of the envelope. To knowingly exceed the design limits or experiment in regions of high angle-of-attack increases the possibility of out-of-control flight. All fighter/attack aircrews live with the reality of aerodynamic limitations. The *Tomcat* exhibits no startling aerodynamic revelations and has proven worthy of the respect and awareness required of all previous tactical jet aircraft. The way to prevent future spin/departure aircraft losses is basic: know your limits, know aircraft operating limits, recognize loss of control, and effect the proper recovery procedures. With fully prepared aircrews conducting realistic training throughout the envelope of the aircraft, the Navy will continue to excel in ACM without the costly loss of aircraft and aircrews due to out-of-control mishaps. ◄

Natural disasters such as floods, violent storms, and fires usually take a heavy toll of lives and cause vast amounts of damage. Also, in the aftermath of these disasters, you can almost make book that one or more helicopters providing relief will be damaged.

Another bit the dust

An overview of the crash site.

THE flight schedule listed two crews in CH-53s for 0700 departures. They were to shuttle troops back and forth between bases and then check in with flood control for other mission assignments. The HAC and copilot of the accident helo were inexperienced, but were qualified in model. They were flying together for the first time, and they were looking forward to helping the disaster victims.

The weather that day was 500-foot overcast, rain, visibility 3 miles, and the winds were calm. The squadron had been in the disaster area for a week providing assistance. The designated landing zone was a grassy area, 150 by 200 feet; however, the area included two-story buildings with TV antennas on two sides, numerous towers, and in one corner of the landing zone, a building made things interesting. Of course, along one side were the ever-present powerlines. The landing zone was the largest, least obstructed area in the city. It was capable of handling a CH-53 or two CH-46s simultaneously.

The pilots and crew of the doomed CH-53 were thoroughly briefed before takeoff. They were told to carry out their mission and to return before sunset. After the first part of their mission, they checked in with Disaster Control. They were loaded with 10,000 pounds of relief goods and whirled away. They completed that drop without problems and returned for another load.

Again, they were loaded with 10,000 pounds of clothing, rice, and canned goods. The crew looked it over, guessed it weighed about 10,000 pounds as they were told, and fired up their engines. The hover check required 80 percent torque. They took off and proceeded to their drop area. Once over the city, they made several orbits to inspect their zone and to remain airborne until a rain shower passed. Then they made a low approach to further check the zone's suitability. The HAC decided it might be tight, but they could make it.

The next approach was made with the intent to land. The HAC was on final, 75 feet with 30 KIAS, when he didn't like what he saw and decided to wave off. He applied power, the rotor RPM drooped to 94 percent, and the helicopter began a right yaw. The HAC maintained a level

attitude – even climbed slightly – and put in some right cyclic to lessen the yaw. The yaw increased, and balanced flight became a thing of the past.

The turn was taking them directly at a tower, and when the angle-of-bank was increased to avoid the tower, the CH-53 began to settle and rotate faster. The HAC knew he had to land and picked a service station lot. A crash landing was made, one engine was secured, and the crew abandoned the aircraft. A few moments later, one of the crew returned to secure the other engine, which was still running.

On the way down, the helicopter caught a string of powerlines, hit the roof of the service station with the tail rotor, and hit the ground with the ramp and right main gear. The tail rotor separated from the pylon and came to rest on the roof of the building next to the service station. The main rotor blades chopped off a utility pole, separated from the rotor head, and stopped rotation on the roof of the service station.

Calculated, no-wind power required in ground effect was 73 percent torque, and power required out of ground effect was 97 percent. The power available was 111 percent – more than enough.

The HAC overreacted at the time of waveoff. He added power abruptly and became confused when he encountered directional problems. He used improper waveoff techniques. The aircraft was not committed to land at the time of the waveoff, plenty of power was available, and a controlled waveoff could have been made.

The pilots in this accident were lacking on several counts:

- General experience.
- Training time with heavy loads.
- Confined area operations.
- Knowledge of CH-53 directional control problems and tail rotor effectiveness.

Final position of the CH-53. Arrow in upper photo shows the tail rotor on top of building behind gas station while the lower picture shows powerlines tangled in the port mainmount.

NATOPS contains hand signals to communicate just about any information that might be needed in a NORDO situation. Unfortunately, once the sun sets, these are almost useless. At night, standard HEFOE emergency light signals exist, but they only broadly define the

A dark night and a NORDO wingman

By LT Ben Forrest
VF-111

IT'S black . . . very black. No horizon. The weather's overcast with showers in the vicinity. It's a night when you'd just as soon be watching the movie in the readyroom, but the mission of the ship and the air wing doesn't stop at sunset.

Taxi onto the cat with takeoff checks complete, over the shuttle . . . extension, tension, turnin' up. Good gages, stick full aft, passed off to the cat officer. Horizontal, then vertical movement of his wand, burners lighted, good nozzles. Last check of the flaps, turn on the lights. The cat officer touches the deck, and you wait with eyes glued to the ADI. Then POW! You're off into the murk!

Launch and departure are as routine as any night launch and departure can be, but lead is not at the rendezvous point and Departure says your off-count is minus zero. Hmm, give him a couple more minutes . . . nothing.

The alternate rendezvous is overhead the ship, so off we go. The ship's lights are barely visible through a broken cloud layer, and about 4 miles away is a set of flashing lights, level at the briefed altitude. Join up and sure enough, it's Dash One. Neither Departure nor Strike have heard from him, and he's not squawking. He's signaling us now. Let's see, light to top of canopy, then two flashes . . . the HEFOE signal for electrical problems. Hope he means just radio and IFF. He's got good outside lights and the ram air turbine's in, so things can't be too bad. I wish I knew how to ask him his fuel state. His aux receiver is apparently dead – we've tried that. I guess we'll have to assume he's about 300-500 pounds below us since he took off first.

At max conserve, we'd need 2000 pounds more fuel to make the cycle. So, call up Tanker Control and tell them we need 2500 for the NORDO and 2000 for us. I'll put the probe light on to let him know we'll be tanking.

Rendezvous and tanking go uneventfully.

With sufficient fuel to make the recovery, Dash One follows us around for the remainder of the hop, as briefed. Our TACAN's good now, and we head for Marshal after 1½ hours. Once established, we put our hook down – 4 minutes prior to push. Our NORDO's dumping some extra gas. Then . . .

"99 Oscar Lima, Delta Six, stand by for new approach times."

Sh--! Hook up, they've delayed us 15 minutes, so we have to head back overhead for some more tanking. Dash One got the message. His hook's up, and he's stopped dumping. My probe light is on again. He's got to be tired of flying wing.

Tanking completed, we are both 2000 pounds fatter. Then . . .

"Old Nick 201, turn right to 240 and descend to 1200 feet."

Typical! Hurry up, wait, rush, rush, rush! Hook back

nature of a problem. There is an obvious need to develop a standardized system of signals to communicate with a NORDO at night. A recent episode that occurred to me one dark night in the Med brought this fact out loud and clear.

down, we're only 15 miles from the ship, and our NORDO will have to dump at least 1500 pounds, but it should be no problem.

Now level at 1200, gotta be smooth. Dirty-up went well; I've got about 1200 pounds extra gas, so I'll fly onspeed with a fast chevron. Three miles, 2 miles on glidepath, 1 mile on glidepath on centerline, but the ball's a little low. I'll flash my lights to indicate ship in sight. Lights off, break left (on the gages until 1200 feet), lights back on, stay at the NORDO's 10 o'clock position. The lens flashes green – the LSO's got him. But . . . bolter! Here he comes. Only one chance tonight, though. It's so late the ship doesn't have time to let us try again.

"201, gear up, hook up, your signal Bingo, 267 at 105 miles. You will escort 204, and you have an A-7 tanker at your 10 o'clock, 6 miles. He'll lead you to feet dry."

Squawking 7700, we head for our divert field. Let's review that field again – never been there before. Eight-thousand-foot runway, one set of E-28, approach lighting and strobes. Let's get *those* babies on. Emergency safe and minimum safe altitudes reviewed, radar painting the river inlet leading to the field, but no joy on Approach Control. Try tower. All right! An American controller. That sweet little lady says we're No. 2 and 3. Another F-4 just took the gear. Could be 15 minutes to rerig. Sorry, tower, no can wait. We need a clear runway in 5 minutes.

They clear the F-4 off the tarmac, and without arresting gear, clear us to land. Into the break. I do a touch-and-go, and Dash One gets the message and lands. Whew! His chute blossomed. Now, we're on deck, and the ordeal is over except for the debrief. Three hours and 10 minutes airborne.

Analysis. Many of us have had to face this same situation to varying degrees as leader or wingman sometime in our careers. The big question is what can we do to improve these confusing and challenging circumstances? Continued

VF-111 "Sundowner"
NORDO/No Navaids Kneeboard Card

ALL LIGHT SIGNALS WITH RED LIGHT EXCEPT NAVAIDS SIGNAL.

1. Try aux receiver (CH 2 – 266.6 – and Guard).
2. Try PRC-90.
3. If unable 1 and 2, initiate light signals.

A. Lead request usable fuel – three 3-second flashes of flashlight.
NORDO responds with one short flash for every 1000 pounds fuel.
After 3-second pause, one short flash for every 100 pounds fuel.
Lead acknowledge with vertical motion of flashlight.

B. Lead flash exterior lights on and off (series of dots) to ask NORDO about difficulty.
NORDO initiate HEFOE signal with steady flashlight held at top of canopy pointed at wingman. The number of external light flashes following indicates HEFOE code.
Lead acknowledge by repeating signal. HEFOE code can be initiated by either aircraft.

C. Navaids (use white light). After HEFOE code determined, NORDO shine white light at lead for 5 seconds. Then use vertical movement of flashlight to indicate good TACAN and horizontal movement to indicate bad TACAN.

D. Intend to tank. Lead turn probe light on.

E. Affirmative – Vertical movement of flashlight.

F. Negative – Horizontal movement of flashlight.

G. Bingo: Hook up, clean up, flash probe light five times, accelerate.

H. Crossunder: Vertical movement of flashlight or automatic to port wing if probe light is on for tanking.

I. Fuel checks can be initiated anytime by either aircraft with three 3-second flashes of the flashlight.

J. Prepenetration: Hook down 4 minutes prior to expected approach time.

Fig. 1

The "Sundowners" of VF-111 have attacked the problem by establishing a set of standardized procedures and signals to be used in event of a night NORDO. The signals are all on a kneeboard card (Fig. 1) and are thoroughly briefed before every night sortie.

The first piece of equipment to remember in the NORDO situation is the aux receiver. Most squadrons/air wings have an established UHF frequency for NORDOs, so remember to try and contact the NORDO on that frequency. The NORDO aircraft should be sure to set up his switches to enable reception on the aux channel unless his system is completely gone.

The next item on the checklist is the PRC-90 survival radio. From a practical standpoint, it will only be good inside 100 feet with a direct line of sight through the canopies. If there is any part of the aircraft blocking the direct line of sight, forget it. But what easier way to let your helpless wingie know what's going on – and find out exactly what's wrong with him?

If the above two techniques fail, then you are down to light signals. Figure 1 shows the information that we have printed on a kneeboard card to standardize signals and procedures. While they may seem somewhat confusing as you read over them for the first time, we have had several actual situations where we have used the signals very effectively. Of course, to be able to use these signals successfully requires that you brief the procedures frequently and then practice them on a regular basis. Flying F-4s, we have had the distinct advantage of being able to use the RIOs to do the signaling while the pilot concentrates on flying. It would, of course, be far more difficult for a single-seat pilot, IFR, to fly and signal. But does anybody have any better ideas?

If you are the NORDO pilot, ensure you attempt to use every possible method of voice communication including Guard, PRC-90, and the aux receiver. Fly comfortable night parade, and look closely for signals from the lead. If you have an emergency that requires your immediate attention, break off, take the lead, and squawk Mayday. Remember – you are responsible for getting that hog safely on deck. Stay calm, be patient, and cover your six by double-checking and triplechecking all checklists.

Prior planning, study, practice, a little common sense, and good basic airmanship can turn a challenging, relatively dangerous situation into a routine arrestment or landing. Fighter Squadron 111 crews have had the opportunity to try these signals, and they do work. They may not be the whole answer to the night NORDO problem, or they may not even apply to your type of operations. But one thing is certain: you'd better be planning right now what procedures *you* are going to be using if you find yourself with a NORDO wingman on a dark night. ◄

It *could* have been worse

AN IP (instructor pilot) and a new guy were out bouncing a P-3 one day. The new guy was in the left seat and was receiving a good workout.

As they reached the 180 in the pattern, the IP called the tower with a gear report and requested a full stop. The tower advised the P-3 that he was No. 2 behind a *Cessna,* on short base. The IP told the tower they were simulating two engines out. The transmission was acknowledged.

About the time the P-3 turned off the 90, the tower cleared a helicopter for a minimum-time takeoff (whatever that is). Then, quickly, the tower waved off the *Cessna* and cleared the P-3 pilot to land.

The IP queried the tower about a fouled deck but was told the helicopter was taking off. Twice the tower called the helo and directed it to make a right downwind turn from its position. However, the helo pilot not only didn't acknowledge the transmissions, but also delayed departure by entering a 20-foot hover right over the runway at midfield.

The IP figured they were between a rock and a hard place. He took the controls, decided not to wave off for fear of a midair, and rushed the landing. He landed about 1200 feet down the runway, at 115 knots, went to max reverse, and jumped hard on the binders. The port tires blew, and the *Orion* swerved left. However, the IP corrected with asymmetrical power, straightened out the aircraft, and rolled to a stop on the runway centerline.

The P-3 received limited damage. A couple of rigid tube assemblies, *Teflon* hose assemblies, port brake assembly, a support plate, and a shield assembly had to be replaced, and the No. 1 engine nacelle aft of the firewall required repair.

There's no doubt the IP was a tad less vigilant than he might have been, but what was the reason for rushing things after they landed? One could Monday-morning quarterback this incident by surmising a whole host of possibilities. However, we'll limit ourselves to hoping that the IP never meets the helo pilot.

All aircraft in the soft light of early morning, waiting for a crew and passengers to board, are pretty – some are even beautiful! All aircraft in the harsh light of midday, covered with foam and gutted by fire, are ugly – even sickening! In this accident, the difference between the pretty and the ugly was . . .

Loss of control on takeoff

1124 – *Tower, this is 134, request taxi instructions.*
– *134, you are cleared to taxi Runway 20, wind 130/6, altimeter 29.85.*

1125 – *134, I have your clearance.*
– *This is 134, wait one . . . OK, go.*

1126 – *134, you are cleared to destination via flight planned route, climb and maintain 9000.*
– *This is 134, wilco.*

1127 – *134, I have an amendment. You are cleared to destination via checkpoint and airways, cross the checkpoint 2500 feet or above, then climb and maintain 9000 feet.*
– *This is 134. Understand cross checkpoint 2500 or above, then to 9000. Wilco.*
– *OK, 134, that's affirmative.*

1133 – *Tower, this is 134 ready to take off.*
– *134, you are cleared for takeoff.*

1135 – *This is tower. Crash on the field! Crash on the field!*

It took 30 minutes to extinguish the fire. The aircraft was a total loss.

Clearly visible tire marks show left swerve just prior to leaving the runway. The aircraft is burning in the background.

THE pilots were experienced, with a total of 3600 hours between them, about equally divided. However, in model, the copilot had only 33 hours and the pilot-in-command had 150 hours – and thereby hangs the tale.

Initially, both pilots had received a smattering of training in model by a sister service, which amounted to a basic checkout and familiarization. They had passed a written exam and a flight check. Their command, located in a remote area, accepted this as being equivalent to a Navy designation "NATOPS qualified in model." Not so.

On the day of the crash, the copilot was in the left seat, making the takeoff. He was fairly new at the activity, having been aboard 5 months. During that time, he had logged seven landings, three takeoffs from a start, and three touch-and-go takeoffs. He had only one training flight. The TPC had been more active. In the preceding 90 days, he had flown 112 hours in model, of which 18 hours were actual instruments and 11 hours were at night.

When cleared to take off, the aircraft made a 90-degree right turn onto the runway, and the copilot began a rolling takeoff – *without locking the tailwheel.* He felt the aircraft was tail-heavy because it took a long time to come up. (Naturally it did. All of the copilot's experience had been in an empty aircraft with a training gas load. This day he had 14 souls onboard and a full gas load.)

A swerve to the right developed but was corrected with rudder. Another swerve to the right began, followed by a gradually increasing left turn. About 1600 feet after starting the takeoff, the aircraft left the runway at a 30-degree angle, indicating about 60 knots.

The aircraft became partially airborne in a nose-high attitude, and both pilots were frantically working the controls. They traveled 700 feet out into the toolies until they saw a drainage ditch in front of them. One of them kicked the aircraft back to the runway heading and paralleled the ditch with the port main gear overhanging the ditch. The aircraft hit an earthen bridge, commenced a cartwheel for 150 feet, and came to rest in another 150 feet, straddling the ditch. The ruptured fuel tanks were already burning before the aircraft came to a stop, and ultimately it was almost totally consumed by fire. Firetrucks arrived within 3 minutes and extinguished the blaze in 30 minutes.

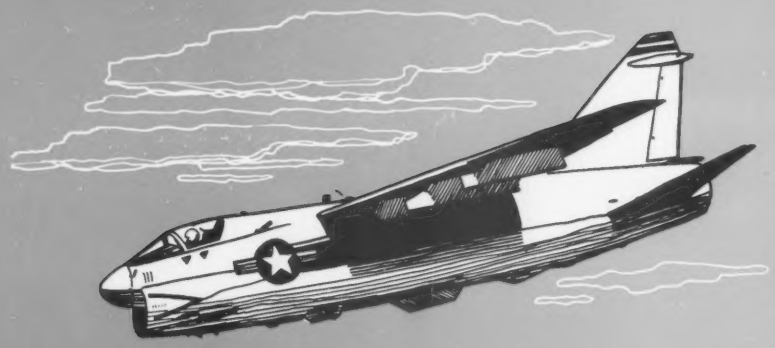
All but one crewman onboard evacuated quickly. He was trapped in the aircraft and perished. Within the next week, two others died as a result of burns.

There were numerous errors in the entire conduct of the flight. It was discovered there was only 20 minutes between filing and takeoff. A manifest of those onboard had not been completed and filed with Operations. There was no briefing of crew or passengers. One passenger wasn't even seated during the takeoff. Personal articles and some cargo being carried were not tied down. Directly contributing to the accident was the decision by the pilot-in-command to allow the copilot to perform a takeoff that was beyond the copilot's level of experience. The pilot-in-command then failed to recover the situation before it deteriorated beyond his own capabilities.

There were NO professionals in the cockpit on this flight! ◄

Bravo Zulu

ENS Burt Thorp
and
LT Ron Fischer
VA-174



PERIODICALLY, a bird strike mishap occurs that highlights the dangers our feathered airborne companions pose. While many bird strikes cause no more than superficial damage, some cause major damage and even loss of aircraft. A recent bird strike could easily have resulted in the loss of an A-7 – and it almost did – except for the outstanding performance of ENS Burt Thorp and his chase pilot, LT Ron Fischer.

LT Fischer and ENS Thorp of VA-174 briefed for a low-level navigation training flight through central Florida. Takeoff and the initial portion of the flight of two *Corsairs* were normal in all respects. However, things would soon drastically change for the worse, and ENS Thorp would be thrust into the most harrowing experience of his young career.

Shortly after passing the halfway point on the route, ENS Thorp was scanning his instruments and charts when suddenly and without warning, a large turkey buzzard shattered the right windscreen, smashing into the pilot's helmet and mask. The large bird entered through the right windscreen in an apparent downward vector from above and to the right of the aircraft. It struck ENS Thorp on the right side of his head, shattering his visor and cracking his oxygen mask retaining cup. Stunned and in considerable pain, ENS Thorp lost control of his aircraft, and the *Corsair* rolled into 100 degrees angle-of-bank, losing 100 feet of altitude. At the time of the incident, ENS Thorp was at 200 feet AGL and traveling at 360 knots ground speed – not much room for recovery!

Relying on habits acquired through training and prompted by commands from his instructor, ENS Thorp leveled his wings and pulled up into a climb. LT Fischer, after ensuring ENS Thorp was again in control, asked him for his condition and aircraft status. When it was apparent that ENS Thorp could not talk because of his injuries, LT Fischer instructed him to click his UHF radio button once for a negative response and twice for affirmative. Using this system, LT Fischer first asked if ENS Thorp could see. The answer was negative. Therefore, LT Fischer verbally flew ENS Thorp's aircraft for the next 5 minutes until the injured pilot regained reasonably clear vision.

LT Fischer stopped the climb at 8500 feet and correctly reasoned that the best chance for successful recovery would be Cecil Field with an LSO on station. Jacksonville Center provided invaluable assistance by immediately clearing the flight as lead requested and by passing word to NAS Jax to launch the SAR helo for assistance.

As the flight progressed toward Homebase, ENS Thorp became more lucid and aware of the situation. He overcame his pain and anxiety by busying himself with updating his TACAN position and assessing his options. At approximately 20 nm south of Cecil Field at 8500 feet, LT Fischer transitioned the flight to the landing configuration and commenced a shallow descent into Cecil. The instructor briefed procedures for both arrestment and normal rollout in the event ENS Thorp missed the arresting gear.

The flight turned onto final at 4 miles. At that distance, ENS Thorp's view of the runway was blurred, so LT Fischer gave final lineup instructions. At 600 feet and 1 mile, the LSO on station assumed control. ENS Thorp needed few corrective calls from the LSO as he flew a slightly fast "rails" approach. Touchdown was abeam the mirror, approximately 700 feet prior to the gear. The hook skipped the wire, however, necessitating a normal rollout on the 8000-foot runway. ENS Thorp expertly maintained runway centerline and brought the aircraft to a smooth stop with about 1500 feet remaining. The crash crew installed the ground locks and assisted the injured pilot from the aircraft. He was subsequently transferred to a waiting ambulance and then to the SAR helo where he was transported to the Jacksonville Naval Hospital emergency room. The time from the bird strike to final landing was about 30 minutes.

The superb airmanship, judgment, and professionalism exhibited by both ENS Thorp and his instructor pilot, LT Fischer, were directly responsible for saving a valuable aircraft and, more importantly, averting a possible fatality. Most bird strikes are out of the control of pilots, but the action they take afterwards is not. These pilots were ready for the emergency and knew what to do when it happened. Well done!

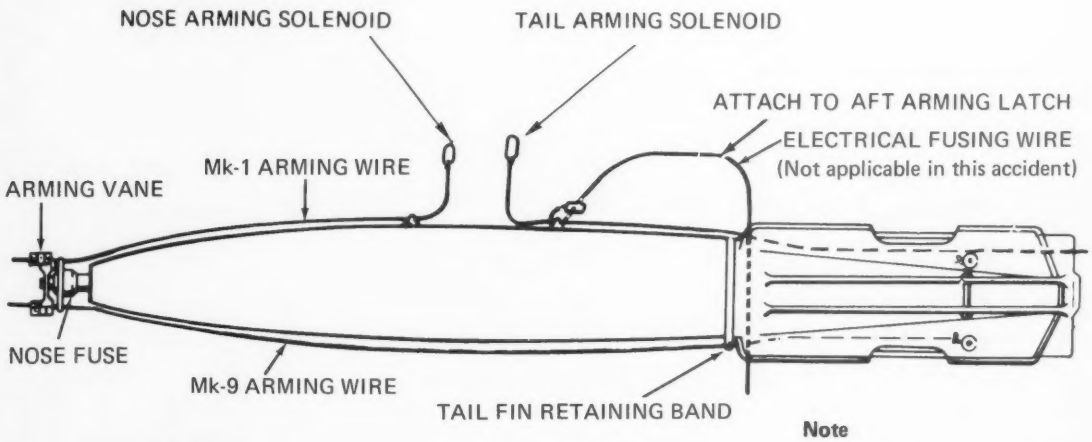
for lack

# of an arming wire

THE pilot noticed that the Mk-9 arming wires were not attached to the Mk-81, 250-pound bombs. The RIO noticed it too. The ordnance officer knew about it and suggested two fixes. Many people knew about the discrepancy, but nobody did anything about it! The result was an F-4 blown out of the sky by its own bombs.

The F-4 crew was practicing for an upcoming airpower demonstration. They had completed practice runs with Mk-76 training bombs and were scheduled for an afternoon practice session using live ordnance. The plan was to drop six Mk-81 bombs in the retarded mode. One and one-half hours prior to takeoff, the pilot-in-command thoroughly briefed the flight, including technique for the delivery run – a level run-in at 100 feet AGL and 500 KIAS.

During preflight, both the pilot and RIO noticed that the Mk-9 arming wires connecting the nose fuse with tail fin assembly (Fig. 1) were not installed. This wire is a safety backup which prevents the bomb from arming in the event



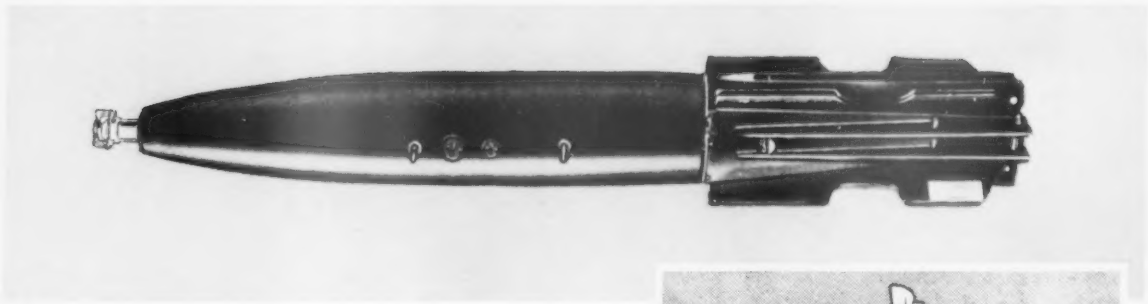
CAUTION

Do not preload arming wires.

Note

Fin to nose fuze arming wire not required if fuze arming delay is set at 6 seconds or greater.

Fig. 1



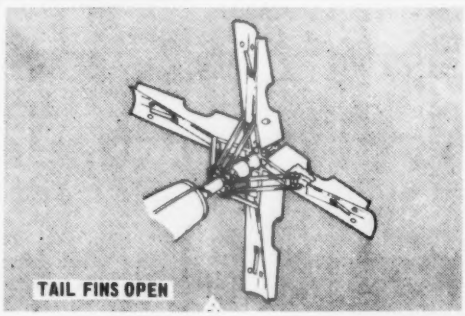


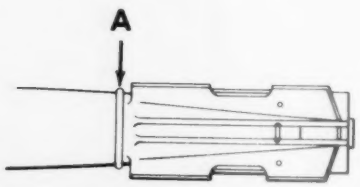
Fig. 2

the tail fins do not open to retard the fall of the bomb. In a level "lay down" type of delivery, retardation of the bomb is essential to allow the aircraft to escape the fragmentation pattern of the exploded bomb.

The tail fin assembly is spring loaded to the open position (Fig. 2) and held shut on the bomb by a metal retaining band. When ordnancemen arm the bomb, they attach a wire to the tail arming solenoid in the rack and insert it through the retaining band hinge (Fig. 3) in place of the safety cotter key. If "Arm – Tail" is selected by the pilot, a solenoid is energized which secures the wire to the bomb rack. When the bomb is dropped, the wire pulls out of the retaining band hinge, releasing the band and enabling the fins to deploy by their spring pressure. If for some reason the fins do *not* open, the Mk-9 arming wire will not be pulled out of the nose arming fuse and the bomb will dud. Without this wire, however, the bomb will be armed (if the pilot selects "Arm – Nose") regardless of whether the fins open or not.

With this in mind, the ordnance officer offered two suggestions. Two Mk-1 arming wires could be joined together to replace the unavailable Mk-9 wire. Or, the tail arming wire could be secured directly to the pylon rather than the arming solenoid.

The pilot considered the options and told the ordnance officer to "do it." He then completed his preflight and boarded the aircraft. Having complete trust in his ordnance officer, the pilot elected not to preflight the correction.



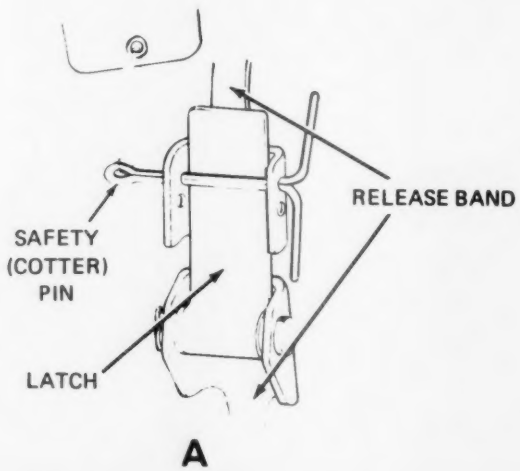


Fig. 3

At this point, a communications breakdown occurred. The RIO questioned the ordnance officer from the cockpit, "Are we positively armed?" He thought he received an affirmative response in the form of a thumbs-up. The ordnance officer stated that he never heard the question and never gave a thumbs-up. What he did do was to tell the RIO to ensure that the pilot selected "Arm – Nose and Tail" prior to dropping the load.

The final result was the aircraft launching with the bombs configured exactly as they were during preflight – minus the Mk-9 arming wires with no "fixes" incorporated. The *Phantom* proceeded to the range followed by two playmates who would drop practice ordnance only. Lead planned to make one run, rippling all his bombs.

Prior to the run, the RIO confirmed all appropriate switches were set and reconfirmed "Arm – Nose and Tail." Cleared onto the target by the airborne FAC, the F-4 streaked into the drop point using a modified run of 400 feet AGL and 400 KIAS. With the pipper on the target, the pilot pickled. Range tower observers saw four bombs come off in the retarded mode (proof that the switches were set correctly), and two come off unretarded. The unretarded bombs detonated on impact almost directly beneath the F-4.

The crew felt a thump and pulled off target cautiously. The wing and fuselage bleed air overheat lights came on – the first indication of trouble. The RIO noticed several large holes in the wing, and fuel pouring from the wingfold area. Hydraulic pressure went to zero, and numerous other warning lights came on. Finally, the throttle became stiff, the low fuel light came on, and white smoke started coming from the circuit breaker panel. The pilot steered the crippled fighter toward the center of the river they were over and initiated command ejection. Both crewmen were recovered uninjured.

The overt cause of the accident was one of the following: a failure of the rear solenoid on two stations of the bomb rack; a broken tail-arming wire; or a corroded retaining band. One of these failures caused the fins to remain closed and the bomb to drop in the unretarded mode. As much a cause of the accident, however, was the absence of the backup Mk-9 wire that would have prevented the bomb from arming and detonating – had it been installed.

How was it possible for three professionals to recognize and identify this serious discrepancy and yet not correct it? Not an easy question to answer. The aircrew had full confidence in the ordnance officer and felt sure he would accomplish one of the two fixes. The ordnance officer undoubtedly felt pressure to get the flight out on time. The pilot of the aircraft was the ordnance officer's boss, so in addition to the normal can-do spirit, the Gunner probably felt particularly anxious to please and support his department head. To modify the wires as discussed would probably have taken between 10 and 30 minutes, and with the crew already strapped in, this delay seemed even more unacceptable.

In summary, the following factors caused the accident:

- Failure of the ordnance officer to load the ordnance in accordance with current directives.
- The aircrew failed to ensure that the ordnance was properly loaded.
- The Mk-9 arming wires were not immediately available to the loading crew.
- Two aft solenoids failed and/or two fin arming wires failed and/or the fin release bands were corroded, preventing opening.

Elimination of any one of these four elements would have prevented the mishap. Which one of these elements would have been eliminated in your squadron? All . . . or none? ◄

Airborne Medical Emergency

A 28-year-old fighter pilot launched off a WESTPAC carrier on an ACM hop. During the engagement, he complained of not feeling well and elected to return to the ship. A discussion with his RIO led the crew to investigate the possibility of contaminated oxygen, but since the RIO felt no adverse effects, this was ruled out. Again the pilot experienced drowsiness, chest pains, and numbness, and he instructed the RIO to select COMMAND EJECT in case he couldn't bring the aircraft aboard.

Fortunately, he was able to manage an uneventful carrier landing. The pilot's oxygen mask and oxygen supply were checked with negative results. Upon reporting to sickbay, a flight surgeon diagnosed a myocardial infarction (a form of heart attack). Obviously, the young lieutenant had accomplished a superhuman feat in bringing his *Phantom* back, but neither crewmember had broadcast that the pilot was having difficulty. If ever an aviator needed all the help that was available, this was the time. This occurrence readily points out that a heart attack can happen to anyone. But in any situation, it is just plain good headwork to utilize *all* sources of assistance. ◄

By LTJG Greg DePrez
VA-82

Been standing down?

How're you going to get 'em "back in the saddle"?

Postcruise standdown over? Time to stop horsing around and get back in the saddle.

Are you doing a thorough preflight every time, or do you just check the mainmounts and exhaust?

SO, the squadron's back from a busy deployment, and the standdown's been a pleasant break from the hectic pace. But now it's time to quit horsing around and get back in the saddle. What sort of program does operations/training have lined up for getting the squadron up to speed for shore-based operations?

"Easy," you say, "We're familiar with the aircraft and systems – we've been exercising them to the hilt. A little brushup on field procedures and local rules, and we'll be all set to go!"

Hold your horses! You can do better than that! Why not arrange a simple but thorough program that takes advantage of local assets to get your people familiar with the new environment before you get them airborne? A 1- to 3-day schedule arranged for maximum participation could include the following events:

- Schedule a review of basic systems at the local Naval Maintenance Training Detachment. Using their training devices, NAMTRADET instructors can cover a lot of territory quickly and comprehensively. For example, maybe the fuel transfer system didn't give the squadron any problems on the deployment. Has it lulled anyone into complacency? Does everyone recall what's what when it fails? What are those new airframes or powerplants changes?

Are you up to speed on emergency procedures after the complacency of all that "no problems" flight time? Do you feel comfortable with your cross-country vehicle?

- Invite RAG instructors over for operational briefs on the aircraft and systems. What has changed in the SOP while the squadron's been gone, and why? What new hardware or techniques have they tried that are "coming down the pike"? How about a review of emergency procedures from the folks who teach them every day.

- Have a wing representative stop by to discuss the latest trends they've noted in the community. How do returning squadrons embarrass themselves? What are the latest changes to training routes, targets, operation areas? What's new in wing SOP at the field?

- Invite an FAA representative over. What are the current procedures and expectations locally for handling military traffic? (Why not make a good impression before you get airborne!)

- Use available flight simulators to schedule everyone for several missions. Get their minds back on flying after the standdown fling.

- Check instrument quals. Was that deployment mostly good weather flying? Is everyone set to handle those local thunderstorms or operate entirely in controlled airspace?

If you've done all these, congratulate yourself. If you're ready to go (not just willing), then congratulations – you're back in the saddle!

When was the last time you *really* read NATOPS? Full knowledge of all systems is particularly important for "single-seaters."

Letters

"Disregard Your Directional Gyro" – More

Nashville, TN – My comment on LtCol Cathcart's article, "Disregard Your Directional Gyro . . . " (JUN '77), is Amen! If you dig in your archives, you will find record of a crash of two A4D-2s at El Toro in 1959. A nugget on a late night 700 and three-quarters GCA led his second tour wingman/chase into a beanfield. This unfortunate young man was trying to solve the insoluble; vertigo produced erratic course corrections which resulted in what was then called a "no-gyro approach," which all added up to hopeless confusion. Even a very experienced aviator would grit his teeth and sweat blood in those circumstances.

As a result of that accident, the terminology was changed from "Disregard your gyro" to "Disregard your directional gyro" because the board believed this gent – like most of us – had been trained to think of the attitude indicator when someone used the word "gyro."

Nevertheless, the basic problem is still with us, and LtCol Cathcart is very correct when he recommends that the no-gyro approach should be used only when it really needs to be used, and then by careful and methodical prearrangement. If the GCA controller suspects directional gyro failure in the early stages of an approach (prior to glide slope), he should discuss the matter with the pilot. If the gyro's working and there's some other problem (sloppy response from the pilot, etc.), we'll get it fixed. If the gyro's out, we can take our time and set up a no-gyro approach, maybe practicing "Start and stop all turns" while circuiting the pattern.

If the directional gyro failure is suspected after glide slope intercept, the aircraft should be directed to go around, given the reason, and the matter discussed as before. For low fuel state situations, of course, both the pilot and the controller should be prepared for the compounding circumstance.

Incidentally, I think we stopped short in the 1959 change of terminology. I think the word gyro should be dropped completely and the words "heading indicator" used in this circumstance. That term applies whether you're flying needle/ball and wet compass, or a flight director, or whatever is in between.

LtCol Hank Searle, USMC
NROTC Vanderbilt University

Emergency Oxygen Is Just That

NAS Norfolk, VA – While one cannot comment too adversely on success, when initial breathing difficulty was encountered by the aircrew in the article "But One Breath Left" (JUN '77 APPROACH), an immediate shift to emergency oxygen may have minimized the requirement for a dramatic split-S to gain a lower altitude and breathable air.

I suspect that too many aircrews feel that the emergency oxygen supply is reserved for the exclusive use of ejection or bailout and not as an emergency source of oxygen – just as the name implies.

CDR R. W. Barrett
XO, VAQ-33

● Good point! The emergency oxygen should be used when it's needed. Had the crew recognized the oxygen failure immediately, they could have activated the emergency oxygen and averted the emergency maneuver. However, the problem manifested itself initially as reduced oxygen flow, prompting the pilot to descend in a normal fashion without taking emergency precautions. By the time the pilot realized that they had a total oxygen failure, the BN was unconscious and the pilot was becoming hypoxic. The BN had removed his mask when the oxygen flow ceased, so the pilot would have had to hook up the mask before pulling the emergency oxygen supply. In this *extremis* situation, the split-S was probably the most expeditious procedure to restore oxygen.

Hypoxia is a full-blown emergency that doesn't allow a pilot much time to take corrective action. All aircrew should certainly keep the emergency oxygen supply in mind in these situations and not be hesitant to use it.

Do Senior Aviators Really Lead? or Setting the Example – Who Me?

FPO, San Francisco – As a fledgling aviator, I used to look for a senior aviator to emulate. He had to be of extraordinary skill and a leader of men. Not finding one in particular, I was willing to accept the traits of various individuals to follow. That was what seemed like a short time ago.

Now I am the senior aviator who should be showing the way. I have all sorts of directives and rules to follow so that my best demonstration is to follow all of them to the best of my ability.

At the same time, I have to wonder what my fellow senior aviators are thinking – especially after tours as an LSO, pilot

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, VA 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

instructor, maintenance officer, and CATCC officer. In these various billets, I have seen senior pilots do some not altogether standard practices, but I know that all of it is a thing of the past – or is it?

We have more stringent rules and better NATOPS programs to follow today. Yet many senior aviators are still living in the past. For example, the CO who tells his pilots to fly the bolter-waveoff pattern with the gear up and then complains that CATCC is AFU because he is given S-turns to stay behind the slower (same type) aircraft in front.

How 'bout the senior type who goes on a cross-country from A to C and bypasses B because the winds were good – yet when he lands at C, one engine flames out on rollout. This is not fiction – just cold, hard facts.

Here is one that all line officers will appreciate. The senior gent is a good stick on the ground and in the air. He demonstrates this by turning off the motors after a flight, prior to turning into his parking spot. Sure, momentum can carry all of us a long way. Consider too the gent who says after launch, "I'll hold overhead for 10 minutes and then head for Homebase." You launch, climb to briefed rendezvous angels, and on your tactical frequency you hear him tell you he's 50 miles en route and try to catch him.

For some, it is older and bolder, or is that a sign of dementia? Whatever the case, we must have aggressive aviators who know their limits, their aircraft's limits, and most importantly, when not to approach those limits. What are we to expect when the "leaders" show little restraint and poor judgment? I now say let me be the example and those that choose may be the fools.

LCDR P. J. Maugeri
VAW-112

Fowl Play

Kaneohe, HI – Thanks to LTJG D. C. Blanton for a "humorous expose" of a serious subject (AUG '77 APPROACH, "Birds Organize in Strike"). I was the unfortunate IP behind the TA-4J windscreen and helmet pictured!

The incredible thing about this particular bird strike was that it occurred at approximately 2800 feet in marginal IMC weather – them little devils have instrument cards and disregard their semicircular rules! The student pilot, who was obviously sweating his instrument check under the bag in the back seat, thought his IP had bought the proverbial farm. A large chunk of "Deep

Beak" managed to slip under the instrument hood and land in his lap. He assumed that this unidentified piece of seagull anatomy constituted the remains of his checkpilot. The landing was everything but uneventful, as I had to S-turn the aircraft on final under LSO control due to the lack of forward visibility.

Prior to this encounter, I rendered my share of guffaws and yellow stamps whenever the ASO's readyroom brief dealt with migratory and other fowl. I was a fast learner.

Capt R. A. "Mad Dog" Maddocks
VMFA-212

World-Famous Flight Gear Survey

FPO, San Francisco – The World-Famous Golden Dragons of Attack Squadron ONE NINETY-TWO would like to respond in mass to your article, "The Pilot's Dilemma" (JUN '77 APPROACH). A flight gear questionnaire was circulated among our 17 aviators. Following is a brief summary of the responses received.

Helmets. Pilots with the Protection, Inc. types loved them. Everyone felt the APH-6 was too heavy and uncomfortable and restricted upward visibility. Some of the suggestions for improvements were: a) earcups that would accommodate eyeglass frames; b) retain dual visors for the transitioning light periods; c) better routing for the mic cord. In general, the complaints were that our helmets are loose fitting, uncomfortable, and difficult to adjust.

Oxygen Mask. This received the largest number of "boos" and broken pencils. They are too bulky, inhibit head movement, and restrict lower visibility. Most pilots felt that a more comfortable seal would more than compensate for any chance of the mask collapsing underwater. We would also like a more flexible oxygen hose and less pressure resistance to breathing.

SV2 Vest. We feel the vest hinders movement in the cockpit and was, in general, too bulky. Is all the gear we carry really necessary, and can't it be better distributed? We would like to see better adjustable straps. Also, the inflation actuators on the attached LPA should be easier to use.

Torso Harness. It's uncomfortable, but a necessary evil.

G-Suit. A more professional fitting at initial issue would make the anti-G suit more comfortable and really useful.

Flight Suits. A Navy flight suit next to its Air Force cousin is ill-fitting (on any world-famous aviator) and just looks like a million dollars (green and wrinkled)! Why can't we tailor our flight suits, take away a few of the pockets, and even use a two-piece? Our flight suits have never fit well or looked decent, and the style has never changed – only the color. Some real improvements in fit and especially appearance are needed.

Flight Gloves. Many pilots do not use their gloves because they are too hot and are difficult to use in water. We need functional and adequate replacements now.

Flight Boots. Boots modified with a zipper would be nice, but what we really need is an additional pair for winter use. Why not a winter and summer pair?

The World-Famous Golden Dragons would be more than willing to evaluate more suitable flight gear for Fleet use if new and better flight gear is purchased. We are unanimous in our feeling that a very serious look at a complete revamp of our flight gear is needed.

Gold Sox are the only way to fly!

LT R. E. Noziglia
VA-192

• Your attention is called to the article, "Flight Gear Problems – NADC's Point of View." The author, LT Van Devender, discusses what is being done about flight gear development. The article appeared in the SEP '77 issue of the World-Famous APPROACH Magazine.

Vol. 23 No. 4

NAVAIR 00-75-510

approach

32

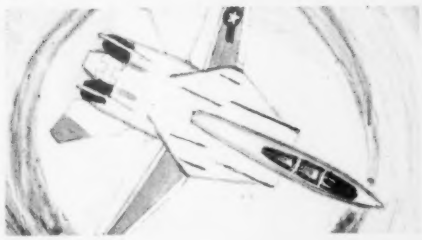
CONTENTS

1 Beware the Fuel System!
8 A Disastrous Functional Checkflight
10 *Tomcat* Tailspin
By LCDR J. A. Campbell
14 Another Bit the Dust
16 A Dark Night and a NORDO Wingman
By LT Ben Forrest
19 It Could Have Been Worse
20 Loss of Control on Takeoff
24 For Lack of an Arming Wire
28 Been standing down? How're you going to get 'em "back in the saddle"?
By LTJG Greg DePrez

DEPARTMENTS

6 Air Breaks
22 Bravo Zulu
30 Letters

Pg. 1



Pg. 10

Pg. 24

A Naval Safety Center Publication

Our product is safety, our process is education, and our profit is measured in the preservation of lives and equipment and increased mission readiness.

PURPOSES AND POLICIES/APPROACH presents the most accurate information currently available on the subject of aviation accident prevention. Contents should not be considered as regulations, orders, or directives and may not be construed as incriminating under Art. 31, UCMJ. Photographs used to illustrate articles in APPROACH do not necessarily reflect the actual aircraft, air stations, ships, and individuals that are described in the text.

PHOTOS/Official Navy or as credited. Non-naval activities are requested to contact NAVSAFECEN prior to reprinting APPROACH material.

CORRESPONDENCE/Contributions are welcome. The right to make editorial changes to improve the material without altering the intended meaning is reserved. Reference to commercial products does not imply Navy endorsement. Views of guest-written articles are not necessarily those of NAVSAFECEN.

DISTRIBUTION/Requests for distribution changes should be directed to NAVSAFECEN, NAS Norfolk, VA 23511, Attn: Safety Publications Department. Phone: Area Code 804, 444-1321.

PRINTING/Issuance of this periodical approved in accordance with Department of the Navy Publications and Printing Regulations, NAVEXOS P-35. Library of Congress Catalog No. 57 60020.

CREDITS/An EA-3 *Skywarrior* escorts F-4 *Phantoms* during exercises against surface units. The cover painting is by staff artist Blake Rader.

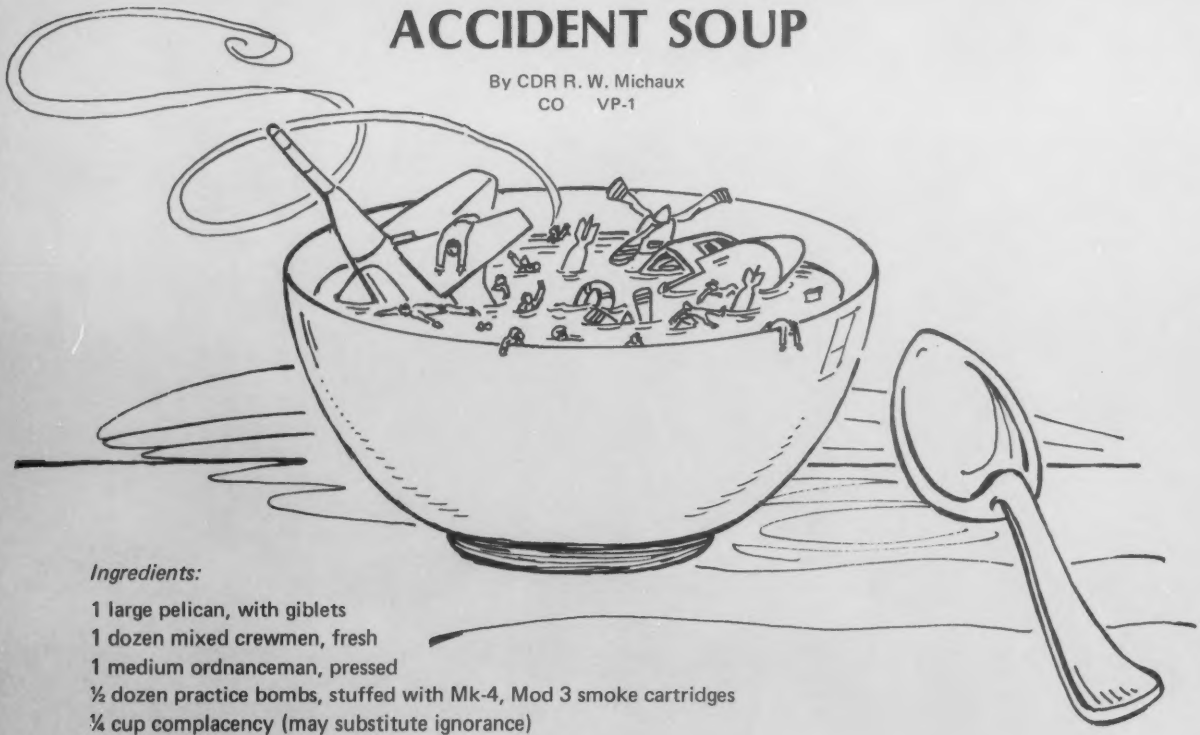
☆U. S. GOVERNMENT PRINTING OFFICE: 1977—735-002/13

RADM Wm H. Ellis
Commander, Naval Safety Center
CAPT W. F. Rau
Chief of Staff
CAPT Robert Lewis
Director, Aviation Safety Programs

LCDR Wayne N. Rauch, Editor-in-Chief
LCDR Barry Patterson, Publications Editor
LT Donald A. Burke, Editor
Robert Trotter, Art Director
C. B. Weisiger, Helicopter Writer
R. P. Shipman, Fixed-Wing Writer
Blake Rader, Illustrator
Jack LaBar, Illustrator
Catherine M. Salas, Editorial Assistant
Luvenia Kelly, Type Composer
Alice Jarman, Type Composer

ACCIDENT SOUP

By CDR R. W. Michaux
CO VP-1



Ingredients:

1 large pelican, with giblets
1 dozen mixed crewmen, fresh
1 medium ordnanceman, pressed
½ dozen practice bombs, stuffed with Mk-4, Mod 3 smoke cartridges
¼ cup complacency (may substitute ignorance)
32,000 pounds sauce JP
Pinch NATOPS, ORDINSTs, and checklists
1 teaspoon common sense (optional)

Place one PATRON pelican with fresh crew in READIEX 77 pressure cooker. Add pressed ordnanceman, and lace with stuffed practice bombs. Turn on high heat, and shake with a tight schedule. Stir occasionally with ASW scenario for 4 to 6 hours.

Pickle practice bombs, saving one for spice. Remove from heat, and set bird and contents aside to cool at NAS.

Place bird, crew, and ¼ cup complacency in fuel pit; slowly add sauce JP.

NOTE: Ensure garnish of stuffed practice bombs is removed prior to adding sauce JP, or a *flambe souffle* may result.

RECENTLY, a PATRONPAC aircraft and crew cooked up quite a stew using the above recipe. While the ingredients were there for a dangerous situation or accident, the actual result was, fortunately, just several red faces and a good lesson learned.

During participation in READIEX 77, Crew 13 briefed for a short bombex flight designed to demonstrate weapons delivery procedures and crew proficiency. Due to miscellaneous delays and manpower shortages, the weapons loading of the aircraft was rushed. It being a routine, "dummy" weapon load, the checklists were omitted for the sake of expediency. The result was predictable; after delivery, one practice shape remained hung in the bomb bay. This was of only passing interest to the flightcrew. An uneventful transit back to NAS and subsequent landing were made, with no mention of the ordnance still aboard. The aircraft then proceeded to the fuel pits to top off with a standard ramp load. (The sauce thickens.)

At this stage in the recipe, a visiting chef stepped forward to save the stew. An observer who had been aboard for the entire flight and had witnessed the nonstandard loading of the weapons finally came forward to apprise the flightcrew of the existing potential hazard and the circumstances leading up to it. The subsequent taxiing, disarming, and download evolution was carried out by a red-faced crew using checklists and base ORDINSTs. It was a cheap cooking lesson for all hands. Ordnance procedures, like fine foods, take time and talent to do right.

NEVER kiss the lip of the runway!

It can be a real bruiser.

Idea submitted by LCDR S. M. Levin, ASO, VT-24.